20 MICROSCOPY

20.1 Introduction to Microscopy

20.1.1 Objectives

Through completion of this module the trainee will have developed and demonstrated theoretical knowledge and/or practical skills to:

- Relate the general history of microscopy;
- Describe the theory and use of various types of microscopy (stereoscopic, phase contrast, dispersion staining, polarizing, other);
- Describe the construction of various types of microscopes, including the purposes for the various components;
- Demonstrate proper techniques and care for using various types of microscopes; and
- Describe the theories of light and the techniques for proper illumination of the samples.

20.1.2 Required Readings

20.1.2.1 Benford, James R., "The Theory of the Microscope," Bausch and Lomb, 1965.

20.1.2.2 DeForest, P.R., “Foundations of Forensic Microscopy”, Saferstein, R., ed., Forensic Science Handbook, Volume 1, 2nd edition, Pearson Education, Inc., New Jersey, 2002, pp.215-319.

20.1.2.3 Delly, J. G., "Photography Through the Microscope," Kodak Publication P-2, 9th ed., 1988.

20.1.2.4 Hallimond, A. F., The Polarizing Microscope, Vickers, Ltd., New York, 1970.

20.1.2.5 McCrone, et. al., Polarized Light Microscopy, McCrone Research Institute, Chicago, IL, 1984.

20.1.2.6 Mollring, F. K., "Microscopy from the Very Beginning," Carl Zeiss, 1971.

20.1.2.7 Shelley, D., Optical Mineralogy, 2nd. ed., Elsevier Science Publishing Co., 1985.

20.1.3 Questions

The trainee will provide written answers to the following questions:

- Describe the operation of the stereomicroscope in layman’s terms.
- What is the difference in the image produced by a stereomicroscope versus a compound microscope.
- What is polarized light?

20.1.4 Practical Exercises

20.1.4.1 The trainer will demonstrate the proper achievement of illumination to include at a minimum diffuse, Koehler and Nelsonian methods.

20.1.4.2 The trainer will demonstrate techniques for utilizing bright field, dark field, and phase contrast microscopy.

20.1.4.3 The trainer will demonstrate refractive index determinations utilizing the Becke line method, dispersion staining and oblique illumination methods.

20.1.4.4 The trainer will demonstrate photomicrography with the digital camera.

20.1.4.5 The trainee will demonstrate their ability to perform 20.1.4.1 through 20.1.4.4 as applicable to their subdiscipline of training.

20.1.4.6 The trainee will demonstrate proficiency in taking measurements using micrometers.

20.1.5 Evaluation

19.1.5.1 The trainer will review the written answers to the questions with the trainee.

19.1.5.2 The trainer and the trainee will review and discuss the pertinent points of each of the required readings.

19.1.5.3 Review of practical exercises.

19.1.5.4 The trainee will be quizzed orally upon the subject matter.

20.2 Competency Evaluation and Mock Trial

The trainee will use microscopy when completing their subdiscipline competency test and will defend their results as a part of their mock trial in that subdiscipline.

20.3 Reading List

20.3.1 Benford, James R., "The Theory of the Microscope," Bausch and Lomb, 1965.

20.3.2 Delly, J. G., "Photography Through the Microscope," Kodak Publication P-2, 9th ed., 1988.

20.3.3 Hallimond, A. F., The Polarizing Microscope, Vickers, Ltd., New York, 1970.

20.3.4 McCrone, et. al., Polarized Light Microscopy, McCrone Research Institute, Chicago, IL, 1984.

20.3.5 Mollring, F. K., "Microscopy from the Very Beginning," Carl Zeiss, 1971.

20.3.6 Saferstein, R., ed., Forensic Science Handbook, Volume 1, 2nd edition, Pearson Education, Inc., New Jersey, 2002.

20.3.7 Shelley, D., Optical Mineralogy, 2nd. ed., Elsevier Science Publishing Co., 1985.

◄End